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(54) **MACRODIVERSITY METHOD AND SYSTEM WITH SIGNAL COMBINING IN THE BASE STATION**

MAKRODIVERSITÄTSVERFAHREN UND SYSTEM MIT SIGNALKOMBINATION IN DER
BASISSTATION

PROCEDE ET SYSTEME UTILISANT LA MACRODIVERSITE AVEC COMBINAISON DE SIGNAUX
DANS LA STATION DE BASE

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(73) Proprietor: **Nokia Corporation**
02150 Espoo (FI)

(72) Inventors:
• **KEKKI, Sami**
FIN-00260 Helsinki (FI)

• **LONGONI, Fabio, Nokia Networks**
E-29590 Campanillas, Malaga (ES)

(74) Representative: **Style, Kelda Camilla Karen et al**
Page White & Farrer,
54 Doughty Street
London WC1N 2LS (GB)

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a method and system for processing signals in a wireless telecommunications system.

BACKGROUND TO THE INVENTION

[0002] The use of code division multiple access (CDMA) is being proposed for the next generation of cellular telecommunication networks. Additionally, code division multiple access is also being used in the IS-95 standard in the USA. CDMA is a direct sequence spread spectrum technique. In a wireless cellular network using CDMA, the mobile stations in one cell associated with a first base station will use the same frequency as mobile stations in an adjacent cell associated with the second base station. The different mobile stations can be distinguished by the respective base stations as each mobile station will be using a different spreading code.

[0003] Soft handover has been proposed in relation to CDMA systems. With soft handover, a mobile station is arranged to communicate with more than one base station at the same time. In particular, the same signals are sent to the mobile station from the various base stations and are combined in the mobile station. Likewise, the signals transmitted by the mobile station are received by the different base stations. The signals received by the different base stations are forwarded to a further network element which combines the signals received by the base stations. This is a cumbersome process in that the network element has to process the signals received from the base stations and also ensure that the signals are received by all the base stations for transmission to the mobile station. In more detail a major problem is the delay introduced by having an interface between the network element that processes the data and the base stations which receive the signals. In addition in some cases the required transmission capacity to convey these signals over the network between the base stations and the network element which processes the signals may cause problems.

[0004] US 6108547 discloses a method to achieve soft handover control between base transceiver stations served by mobile telephone switching offices, by providing a communication line logically isolated from the mobile telephone switching offices between adjacent base transceiver stations. Traffic information is transferred between the base transceiver stations via the communication line, thereby achieving a soft handoff with the control taken by one of the base transceiver stations.

[0005] EP 0645940 discloses a base station and a mobile station in a mobile communication system capable of reducing interference among mobile stations and increasing a subscriber capacity of the system. Base station has a unit for measuring the measurement value

for at least one of the receiving level and an interference ratio level of the mobile station transmission signals and a unit for producing a mobile station transmission power control data specifying a mobile station transmission power required in adjusting the measurement value to a target level according to a number of base stations simultaneously in communication with the mobile station. The mobile station has a unit for measuring a measurement value for at least one of the receiving level and an interference ratio level of the base station transmission signals and a unit for producing a base station transmission power control data specifying a base station transmission power required in adjusting the measurement value to a target level according to a number of base stations simultaneously in communication with the mobile station. In Figure 5 of this document it is shown that the signals received by a base station from a mobile station are sent to a further base station, which the mobile station is already in communication with. The signals are combined at the further base station before being transferred to the network.

SUMMARY OF THE INVENTION

[0006] It is an aim of embodiments of the present invention to address these problems of the known arrangement.

[0007] According to one aspect, there is provided a method for processing signals in a wireless communications system comprising a wireless terminal, a plurality of base stations and a control node, said method comprising the steps of providing the control node with information relating to a designated one of said base stations; providing at least one other of said plurality of base stations with said information from the control node associated with the designated one of said base stations; forming a connection between said designated one of said base stations and said at least one of said base stations using said information; said forming of said connection being controlled by said control node receiving at said plurality of base stations signals from said wireless terminal; sending said received signals from said at least one other of plurality of base stations to the designated one of said plurality of base stations by said connection; and processing in said designated base station the signals received from said at least one other of plurality of base stations and the signals received at said designated base station to provide a single signal.

[0008] By carrying out the combining low in the network hierarchy (in the base stations) some transmission savings may be obtained. It should be appreciated that a mobile switching centre is relatively high in a network hierarchy whilst a base station is relatively low.

[0009] Preferably, the method comprises the step of sending from the control node to the designated base station a request requesting the designated base station set up a connection. The request may include informa-

tion that a connection is to be set up between the wireless terminal and at least one other station. A connection may be set up between the designated wireless terminal and the control node. Identify information may be allocated to said connection. The identity information may be sent to the control node.

[0010] The communication system may comprise a fixed node. The method embodying the present invention may comprise the step of setting up a connection between the fixed node and said designated base station. The step of setting up a connection between the designated base station and the wireless terminal is preferably done before a connection is set up between the or each base station.

[0011] The method may comprise a step of sending a request from the control node to the or each other base station that the or each other base station establish a connection. The request may comprise information relating to the designated base station. The method may comprise the step of setting up a connection between the designated base station and the or each other base station.

[0012] Preferably, the method comprises the step of the designated base station sending data for the wireless terminal to the or each other base station, the designated base station and the or each other base station sending said data to the wireless terminal.

[0013] According to a second aspect of the present invention, there is provided a wireless communication system comprising a wireless terminal, a plurality of base stations and a control node, the control node being arranged to receive information relating to a designated one of said base stations, at least one other of said plurality of base stations being arranged to receive said information from the control node associated with the designated one of said base stations, each of said base stations being arranged to receive the same signals from the wireless terminal, the designated one of said base stations being arranged to receive from the at least one other of said plurality of base stations the signals received from the wireless terminal on a connection formed between said designated one of said base stations and said at least one of said base stations using said information said control node being arranged to control said forming of said connection, said designated one of said base stations comprising processing means for processing the signals received from said at least one other of plurality of base stations and the signals received at said designated base station to provide a single signal.

[0014] According to a third aspect of the present invention, there is provided a base station for use in a communication system comprising a wireless terminal, a plurality of base stations and a control node, each of said base stations being arranged to receive the same signals from the wireless terminal, wherein said base station comprises: first means for receiving signals from the wireless terminal; second means for receiving a re-

quest from the control node, including an indication that there may be at least one other connection between the wireless terminal and one other base station; third means for providing the control node with information relating to the base station, in response to the request; fourth means for receiving from the or each other base station, the signals received from the wireless terminal, on a connection formed between the or each other base station using the information relating to the base station; and a processing means for processing the signals received by the first and fourth means to provide a single signal.

[0015] According to a fourth aspect of the present invention, there is provided a base station for use in a communication system comprising a wireless terminal, a plurality of base stations and a control node, each of said base stations being arranged to receive the same signals from the wireless terminal wherein said base station comprises: first means for receiving a request from the control node to set up a connection with another of said base stations, said request including information relating to the other base station; second means for receiving the signals from the wireless terminal; third means for forming a connection with the other base station, using said information relating to the other base station;

fourth means for transmitting the signals received from the wireless terminal to the other base station on the connection.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] For a better understanding of the present invention and as to how the same may be carried into effect, reference will now be made by way of example to the accompanying drawings in which:

Figure 1 shows a cellular telecommunication network in which embodiments of the present invention can be incorporated;

Figure 2 shows an embodiment of the invention where a first set of procedures have been completed;

Figure 3 shows the embodiment of Figure 2, where a second set of procedures have been completed; and

Figure 4 is a flow diagram illustrating one method embodying the invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0017] Reference will first be made to Figure 1 in which three cells 2 of the cellular telecommunications network are shown. Each cell 2 is served by a respective base transceiver station (BTS) 4. Each base transceiver station is arranged to transmit signals to and receive signals from the mobile stations 6 located in the cell asso-

ciated with the given base transceiver station 4. Likewise, each mobile station 6 is able to transmit signals to and receive signals from the respective base transceiver station 4.

[0018] The embodiment of the invention is described in the context of a code division multiple access system. However it should be appreciated that embodiments of the present invention can be used with other types of multiple access system such as time division multiple access, other spread spectrum techniques, frequency division multiple access as well as hybrids of one or more of the access techniques discussed above.

[0019] With the proposed new CDMA standard, macrodiversity is possible. This means that a mobile station can be connected to more than one base station at the same time.

[0020] Reference is made to Figures 2 to 4. The arrangement of Figures 2 and 3 comprises a mobile station MS 100 which is arranged to communicate with a first base station BS1 102 and a second base station BS2 104. The first base station is connected to a fixed node FN 106 via a terrestrial communication link 108. The fixed node FN 106 is also connected to the second base station BS2 104 again via a terrestrial communication link 110. The terrestrial link takes the form of a wired connection or a wireless connection.

[0021] In the embodiment shown on Figures 2 to 4, the base stations 102 and 104 each include a macrodiversity combiner 130. However in alternative embodiments of the present invention, not all base stations are provided with a macrodiversity combiner. It should be appreciated that some embodiments of the invention may use one or more of these possibilities in the same network.

[0022] A control node CN 112 is provided which has links 114-8 to the fixed node 106, the first base station 102 and the second base station 104 respectively. The control node 112 is arranged to control and set up the various connections, as will be described in more detail hereinafter.

[0023] Embodiments of the invention are used where the macrodiversity combining (MDC) and soft handover (SHO) are performed in one of the base stations involved in the corresponding call(s). Soft handover occurs when a mobile station is in communication with two or more base stations at the same time. The base stations will each receive the signals from the mobile station. The signals received by the base stations are combined (macrodiversity combining) to provide the best possible signal for further analysis. The mobile station will also receive the same signals from each of the base stations. The signals received from the different base stations are also combined in the mobile station.

[0024] The second base station BS2 104 is used for the soft handover connection, that is to transmit and receive the same data as the first base station BS1 102. As will be described in more detail hereinafter, the combining and splitting of the data stream is performed in

the first base station BS1. A connection between the first base station BS1 and the second base station BS2 is established.

[0025] The first set of procedural steps of a first phase will now be described with reference to Figures 2 and 4.

[0026] In the first step S1, the control node CN 112 sends a signalling message to the first base station. This message requests that the first base station BS1 102 setup a first transport connection and a corresponding radio bearer, that is a radio resource connection. The transport connection is the connection between the control node and the base station. The radio bearer is the connection between the control node and the mobile station. In the request, the control node CN indicates that there is a possibility that at least one other connection between a different base station and the mobile station may be setup later on. The connection may include the maximum number of additional base stations that may be used later on. The information may also include the identity of the base stations. However, in preferred embodiments of the invention, the request only indicates that there is a possibility that a mobile station will be in communication with more than one base station. In other words soft handover may occur later on. This at least one other connection is associated with the first one. This will result in the need for macrodiversity combining MDC.

[0027] In step S2, the first base station BS1 102, upon receiving the request from the control CN, initialises its internal resources. The first base station also selects in the macrodiversity combiner the transport address for the first connection and for the at least one other connection. The transport address is the address of the macrodiversity combiner 130, that is, a specific port of the macrodiversity combiner 130 to be used when sending data to the macrodiversity combiner. A binding identifier is also assigned for each transport connection. The binding identifier identifies the transport connection between the control node and the first base station.

[0028] In step S3, the first base station BS1 sends an acknowledgement to the control node CN indicating the success/failure of the requested connection setup. In the acknowledgement message the transport addresses of the macrodiversity combiner are included as well as the binding identifiers for each of the transport connections.

[0029] In step S4, the control node CN controls the transport connection setup between the fixed node FN 106 and the macrodiversity combiner. The transport address and the corresponding binding identifier (that is the transport address and the binding ID that were received from the first base station BS1 in its acknowledgement) are used in the transport bearer setup between the fixed node FN and the macrodiversity combiner of the first base station BS1.

[0030] In step S5, after the successful setup there is a transport connection between the fixed node FN 106 and the macrodiversity combiner 130 of the first base

station BS1 102. In the macrodiversity combiner 130 of the first base station BS1 the termination of the connection takes place in the resource that was addressed by the given transport address and binding identifier.

[0031] The second set of procedures will now be described with reference to Figure 3 and 4.

[0032] In step S6, the control node CN 112 sends a signalling message to the second base station BS2 104, requesting the second base station BS2 104 to setup a transport connection and a corresponding radio bearer connection. In the request the transport address and binding identity of the macrodiversity combiner 130 of the first base station BS1 102 are included.

[0033] In step S7, the second base station BS2 104 establishes the transport connection with the first base station BS1 102, towards the given transport address of the macrodiversity combiner 130 of the first base station. The binding identity is included in the message.

[0034] In step S8, the second base station BS2 104 sends a message to the control node which indicates if the procedure has been successful or not.

[0035] If the procedure has been successful, in step S9, the second base station BS2 sends a control frame to the macrodiversity combiner 130 of the first base station BS1 in the newly established transport bearer indicating the activation of the new soft handover branch. After that the second base station BS2 starts sending to the macrodiversity combiner 130 of the first base station the data frames it receives from the mobile station.

[0036] In step S10, after receiving the control frame or the first uplink UL data frame from the mobile station, the macrodiversity combiner 130 of the first base station BS1 starts the combining of the data frames received from the mobile station. The data frames will be received by the first base station and the second base station and these data frames are combined by the macrodiversity combiner 130 of the first base station. The macrodiversity combiner 130 of the first base station also forwards the data frames received from the fixed node FN to the first and second base station. To do this the macrodiversity combiner needs to copy the received downlink frames before forwarding them. In this way, both the first and second base stations transmit the same data frames to the mobile station.

[0037] If there are more than two base stations involved in the soft handover, the same procedure outlined above will be used to establish connections with the further base stations.

[0038] The third stage of the procedure will now be described. In the third stage, the radio connection between the first base station BS1 and the mobile station is released, without releasing the macrodiversity combiner so that the traffic is going via macrodiversity unit of the first base station BS1 to the second base station. Then the macrodiversity combiner is released.

[0039] In step S11, the control node CN sends a signalling message to the first base station BS1 asking for the release of the connection between first base station

BS1 and the mobile station. The message clearly indicates that the connection between the macrodiversity combiner 130 of the first base station and the fixed node FN and between the combiner 130t and all the other base stations shall not be released.

[0040] In step S12, first base station BS1 releases the radio connection and sends an acknowledgment to the control node CN node. The transport connections to/from the combiner of the first base station are not released.

[0041] In step S13, the control node CN sends a signalling message to the first base station BS1 asking that one or all the transport connections to/from the combiner of the first base station BS1 to the fixed node FN be released.

[0042] In step S14, first base station BS1 releases the connection and sends an acknowledgement to the control node CN.

[0043] Step S11 and S13 can be done simultaneously with the same signalling message.

[0044] It should be appreciated that in the context of the present document, the term combining refers to any possible combining/selection procedure of the data coming from the two or more sources. Macrodiversity combining is well known and any of the known techniques may be used in embodiments of the present invention. For example, the signals can simply be combined, the strongest signal selected, the n strongest signals selected and combined or the signals to be can be combined with different weights. The combiner does not necessarily combine signals. The term combining should therefore be broadly construed to mean the obtaining of signals from two or more sources, the processing of the signal in any way in order to provide a single signal.

[0045] The transport bearer setup and release in the procedure above can be done in the ATM/AAL2 (ATM adaption layer type 2) environment by using the AAL2 signalling protocol as it has been specified in the ITU-T recommendation Q.2630 (AAL2 Type 2 Signalling Protocol). In case of IP (internet protocol) transport technology there may not be any explicit setup procedure but the IP datagrams are sent as self-contained units conveying the address information in the datagram header.

There are both the destination IP address (e.g., in step 9 the address of the BS1 that was given by the first base station BS1 at the initial acknowledgement towards the core node CN) and the originating IP address (e.g., in step 9 the address of the second base station BS2 where it wants the first base station BS1 to send the downlink data frames). On top of IP there may be UDP (user datagram protocol) and RTP (real time protocol) protocols. In this latter case, the binding identity can be either the UDP port number (16 bits, in each UDP header) or the RTP Source Identifier (32 bits, in each RTP header).

[0046] Embodiments of the invention are applicable to any suitable radio access network such as UTRAN

(UMTS (Universal mobile telephone system) terrestrial radio access network) and GERAN (GPRS/EDGE radio access network), especially those with an IP (Internet protocol) based distributed architecture.

[0047] In the embodiment described hereinbefore, the term base station has been used. It should be appreciated that the base station may sometimes be referred to as Node B, depending on the standard involved. The term base station should therefore be construed widely to encompass any entity which provides the same, similar or equivalent function to a base station.

[0048] One proposal for a third generation system uses a UTRAN (UMTS (Universal mobile telephone system) terrestrial radio access network) architecture. In that architecture, the functionality of the fixed node and the control node are incorporated in the SRNC (serving radio network controller).

[0049] It should be appreciated that the link between the first base station and the fixed node and the second base station and the fixed node need not be a terrestrial telecommunications link. The links can take any suitable form. The links between the respective base stations and the fixed node can take different forms. Likewise, the link between the control node and the various elements can take any suitable form.

[0050] Whilst the present invention has referred to mobile stations, it should be appreciated that embodiments of the present invention are applicable to other types of user equipment, for example computer terminals. These computer terminals may be fixed or mobile.

Claims

1. A method for processing signals in a wireless communications system comprising a wireless terminal (100), a plurality of base stations (102,104) and a control node (112), said method comprising the steps of:

- providing the control node with information relating to a designated one of said base stations (102);
- providing at least one other of said plurality of base stations with said information from the control node (112) associated with the designated one of said base stations;

forming a connection between said designated one of said base stations and said at least one of said base stations using said information, said forming of said connection being controlled by said control node;

receiving at said plurality of base stations signals from said wireless terminal;

sending said received signals from said at least one other of plurality of base stations to the

designated one of said plurality of base stations by said connection; and

processing in said designated base station the signals received from said at least one other of plurality of base stations and the signals received at said designated base station to provide a single signal.

2. A method as claimed in claim 1, wherein the method comprises the step of sending from the control node (112) to the designated base station (102) a request requesting the designated base station set up a connection.

3. A method as claimed in claim 2, wherein said request includes information that a connection is to be set up between the wireless terminal (100) and at least one other base station.

4. A method as claimed in claim 1, 2 or 3, comprising the step of setting up a connection between said designated wireless terminal and said control node (112).

5. A method as claimed in claim 4, comprising the step of allocating identity information to said connection.

6. A method as claimed in claim 5, comprising the step of sending the identity information to said control node (112).

7. A method as claimed in any preceding claim, wherein said wireless communication system comprises a fixed node (106).

8. A method as claimed in claim 7, comprising the step of setting up a connection between said fixed node (106) and said designated base station (102).

9. A method as claimed in any preceding claim, comprising the step of setting up a connection between said designated base station (102) and the wireless terminal (100) before a connection is set up between the or each other base station.

10. A method as claimed in any preceding claim, comprising the step of sending a request from the control node (112) to the or each other base station that the or each other base station establish a connection.

11. A method as claimed in claim 10, wherein said request sent from the control node (112) to the or each other base station comprises information relating to the designated base station.

12. A method as claimed in any preceding claim, comprising the step of setting up a connection between

the designated base station (102) and the or each other base station (104).

13. A method as claimed in any preceding claim, comprising the step of the designated base station (102) sending data for the wireless terminal (100) to the or each other base station, the designated base station and the or each other base station sending said data to said wireless terminal (100).
14. A method as claimed in any preceding claim, wherein said wireless terminal (100) is a mobile station.
15. A method as claimed in any preceding claim, wherein said processing step comprises combining said signals.
16. A wireless communication system comprising a wireless terminal, a plurality of base stations (102, 104) and a control node (112), the control node being arranged to receive information relating to a designated one of said base stations (102), at least one other of said plurality of base stations being arranged to receive said information from the control node (112) associated with the designated one of said base stations, each of said base stations being arranged to receive the same signals from the wireless terminal (100), the designated one of said base stations being arranged to receive from the at least one other of said plurality of base stations the signals received from the wireless terminal (100) on a connection formed between said designated one of said base stations and said at least one of said base stations using said information, said control node (112) being arranged to control said forming of said connection, said designated one of said base stations comprising processing means for processing the signals received from said at least one other of plurality of base stations and the signals received at said designated base station to provide a single signal.
17. A base station (102) for use in a communication system comprising a wireless terminal, a plurality of base stations and a control node (112), each of said base stations being arranged to receive the same signals from the wireless terminal, (100) wherein said base station comprises:

first means for receiving signals from the wireless terminal (100);
second means for receiving a request from the control node (112), including an indication that there may be at least one other connection between the wireless terminal and one other base station (104);
third means for providing the control node (112) with information relating to the base station, in

response to the request;
fourth means for receiving from the or each other base station (104), the signals received from the wireless terminal (100), on a connection formed between the or each other base station using the information relating to the base station; and
a processing means for processing the signals received by the first and fourth means to provide a single signal.

18. A base station for use in a communication system comprising a wireless terminal (100), a plurality of base stations and a control node (112), each of said base stations being arranged to receive the same signals from the wireless terminal wherein said base station comprises:

first means for receiving a request from the control node (112) to set up a connection with another of said base stations, said request including information relating to the other base station;
second means for receiving the signals from the wireless terminal;
third means for forming a connection with the other base station, using said information relating to the other base station;
fourth means for transmitting the signals received from the wireless terminal to the other base station on the connection.

Patentansprüche

1. Verfahren zum Verarbeiten von Signalen in einem drahtlosen Kommunikationssystem mit einem drahtlosen Endgerät (100), einer Vielzahl von Basisstationen (102, 104) und einem Steuerknoten (112), wobei das Verfahren die Schritte aufweist:
 - Versorgen des Steuerknotens mit Informationen bezüglich einer bestimmten (102) der Basisstationen;
 - Versorgen mindestens einer anderen der Vielzahl von Basisstationen mit den Informationen vom Steuerknoten (112), die mit der bestimmten der Basisstationen in Zusammenhang stehen;

Bilden einer Verbindung zwischen der bestimmten der Basisstationen und der mindestens einen der Basisstationen, die die Informationen verwendet, wobei das Bilden der Verbindung durch den Steuerknoten gesteuert wird;

Empfangen von Signalen von dem drahtlosen Endgerät an der Vielzahl von Basisstationen;

Senden der empfangenen Signale von der

mindestens einen anderen der Vielzahl von Basisstationen an die bestimmte der Vielzahl von Basisstationen über die Verbindung; und

Verarbeiten der von der mindestens einen anderen der Vielzahl von Basisstationen empfangenen Signale und der an der bestimmten Basisstation empfangenen Signale in der bestimmten Basisstation, um ein einziges Signal bereitzustellen.

2. Verfahren gemäß Anspruch 1, wobei das Verfahren den Schritt zum Senden einer Aufforderung vom Steuerknoten (112) an die bestimmte Basisstation (102) aufweist, die die bestimmte Basisstation zum Aufbauen einer Verbindung auffordert. 10
3. Verfahren gemäß Anspruch 2, wobei die Aufforderung eine Information umfasst, dass eine Verbindung zwischen dem drahtlosen Endgerät (100) und mindestens einer anderen Basisstation aufzubauen ist. 15
4. Verfahren gemäß Anspruch 1, 2 oder 3, mit dem Schritt zum Aufbauen einer Verbindung zwischen dem bestimmten drahtlosen Endgerät und dem Steuerknoten (112). 20
5. Verfahren gemäß Anspruch 4, mit dem Schritt zum Zuweisen von Identitätsinformationen an die Verbindung. 25
6. Verfahren gemäß Anspruch 5, mit dem Schritt zum Senden der Identitätsinformationen an den Steuerknoten (112). 30
7. Verfahren gemäß einem der vorhergehenden Ansprüche, wobei das drahtlose Kommunikationssystem einen festen Knoten (106) aufweist. 35
8. Verfahren gemäß Anspruch 7, mit dem Schritt zum Aufbauen einer Verbindung zwischen dem festen Knoten (106) und der bestimmten Basisstation (102). 40
9. Verfahren gemäß einem der vorhergehenden Ansprüche, mit dem Schritt zum Aufbauen einer Verbindung zwischen der bestimmten Basisstation (102) und dem drahtlosen Endgerät (100), bevor eine Verbindung zwischen der oder jeder anderen Basisstation aufgebaut wird. 45
10. Verfahren gemäß einem der vorhergehenden Ansprüche, mit dem Schritt zum Senden einer Aufforderung vom Steuerknoten (112) an die oder jede andere Basisstation, dass die oder jede andere Basisstation eine Verbindung herstellt. 50
11. Verfahren gemäß Anspruch 10, wobei die Aufforderung, die vom Steuerknoten (112) an die oder jede

andere Basisstation gesendet wird, Informationen bezüglich der bestimmten Basisstation aufweist.

12. Verfahren gemäß einem der vorhergehenden Ansprüche, mit dem Schritt zum Aufbauen einer Verbindung zwischen der bestimmten Basisstation (102) und der oder jeder anderen Basisstation (104). 5
13. Verfahren gemäß einem der vorhergehenden Ansprüche, mit dem Schritt, dass die bestimmte Basisstation (102) Daten für das drahtlose Endgerät (100) an die oder jede andere Basisstation sendet, wobei die bestimmte Basisstation und die oder jede andere Basisstation die Daten an das drahtlose Endgerät (100) senden. 10
14. Verfahren gemäß einem der vorhergehenden Ansprüche, wobei das drahtlose Endgerät (100) eine Mobilstation ist. 15
15. Verfahren gemäß einem der vorhergehenden Ansprüche, wobei der Verarbeitungsschritt ein Kombinieren der Signale aufweist. 20
16. Drahtloses Kommunikationssystem mit einem drahtlosen Endgerät, einer Vielzahl von Basisstationen (102, 104) und einem Steuerknoten (112), wobei der Steuerknoten zum Empfangen von Informationen bezüglich einer bestimmten (102) der Basisstationen eingerichtet ist, mindestens eine andere der Vielzahl von Basisstationen zum Empfangen der Informationen vom Steuerknoten (112) eingerichtet ist, die mit der bestimmten der Basisstationen in Zusammenhang stehen, jede der Basisstationen zum Empfangen der gleichen Signale vom drahtlosen Endgerät (100) eingerichtet ist, die bestimmte der Basisstationen eingerichtet ist, von der mindestens einen anderen der Vielzahl von Basisstationen die Signale zu empfangen, die vom drahtlosen Endgerät (100) auf einer Verbindung empfangen werden, die zwischen der bestimmten der Basisstationen und der mindestens einen der Basisstationen gebildet ist, die die Informationen verwendet, der Steuerknoten (112) zum Steuern der Bildung der Verbindung eingerichtet ist, die bestimmte der Basisstationen eine Verarbeitungseinrichtung zum Verarbeiten der von der mindestens einen anderen der Vielzahl von Basisstationen empfangenen Signale und der an der bestimmten Basisstation empfangenen Signale zum Bereitstellen eines einzigen Signals aufweist. 25
17. Basisstation (102) zur Verwendung in einem Kommunikationssystem mit einem drahtlosen Endgerät, einer Vielzahl von Basisstationen und einem Steuerknoten (112), wobei jede der Basisstationen zum Empfangen der gleichen Signale vom drahtlosen

Endgerät (100) eingerichtet ist, wobei die Basisstation aufweist:

eine erste Einrichtung zum Empfangen von Signalen vom drahtlosen Endgerät (100);
eine zweite Einrichtung zum Empfangen einer Aufforderung vom Steuerknoten (112) mit einem Hinweis, dass es mindestens eine andere Verbindung zwischen dem drahtlosen Endgerät und einer anderen Basisstation (104) geben kann;
eine dritte Einrichtung zum Versorgen des Steuerknotens (112) mit Informationen bezüglich der Basisstation als Antwort auf die Aufforderung;
eine vierte Einrichtung zum Empfangen der Signale von der oder jeder anderen Basisstation (104), die vom drahtlosen Endgerät (100) auf einer Verbindung empfangen werden, die zwischen der oder jeder anderen Basisstation gebildet ist, die die Informationen bezüglich der Basisstation verwendet; und
eine Verarbeitungseinrichtung zum Verarbeiten der von der ersten und vierten Einrichtung empfangenen Signale zum Bereitstellen eines einzigen Signals.

18. Basisstation zur Verwendung in einem Kommunikationssystem mit einem drahtlosen Endgerät (100), einer Vielzahl von Basisstationen und einem Steuerknoten (112), wobei jeder der Basisstationen zum Empfangen der gleichen Signale vom drahtlosen Endgerät eingerichtet ist, wobei die Basisstation aufweist:

eine erste Einrichtung zum Empfangen einer Aufforderung vom Steuerknoten (112), eine Verbindung mit einer anderen der Basisstationen aufzubauen, wobei die Aufforderung Informationen bezüglich der anderen Basisstation umfasst;
eine zweite Einrichtung zum Empfangen der Signale vom drahtlosen Endgerät;
eine dritte Einrichtung zum Bilden einer Verbindung mit der anderen Basisstation unter Verwendung der Informationen bezüglich der anderen Basisstation;
eine vierte Einrichtung zum Übertragen der vom drahtlosen Endgerät empfangenen Signale auf der Verbindung an die andere Basisstation.

Revendications

1. Procédé de traitement de signaux dans un système de communication sans fil comprenant un terminal sans fil (100), une pluralité de stations de base (102,

104) et un noeud de contrôle (112), ledit procédé comprenant les étapes consistant à :

- fournir au noeud de contrôle des informations concernant une station de base désignée parmi lesdites stations de base (102) ;
- fournir à au moins une autre de ladite pluralité de stations de base lesdites informations à partir du noeud de contrôle (112) associé à la station de base désignée parmi lesdites stations de base ;
- former une connexion entre ladite station de base désignée parmi lesdites stations de base et ladite au moins une desdites stations de base en utilisant lesdites informations, ladite formation de ladite connexion étant contrôlée par ledit noeud de contrôle ;
- recevoir au niveau de ladite pluralité de stations de base des signaux provenant dudit terminal sans fil ;
- envoyer lesdits signaux reçus de ladite au moins une autre de la pluralité de stations de base à la station de base désignée parmi ladite pluralité de stations de base par ladite connexion ; et
- traiter dans ladite station de base désignée les signaux reçus de ladite au moins une autre de la pluralité de stations de base et les signaux reçus au niveau de ladite station de base désignée afin de fournir un signal unique.

2. Procédé selon la revendication 1, dans lequel le procédé comprend l'étape consistant à envoyer, du noeud de contrôle (112) à la station de base désignée (102), une requête demandant à la station de base désignée d'établir une connexion.

3. Procédé selon la revendication 2, dans lequel ladite requête comprend des informations indiquant qu'une connexion doit être établie entre le terminal sans fil (100) et au moins une autre station de base.

4. Procédé selon la revendication 1, 2 ou 3, comprenant l'étape consistant à établir une connexion entre ledit terminal sans fil désigné et ledit noeud de contrôle (112).

5. Procédé selon la revendication 4, comprenant l'étape consistant à allouer des informations d'identité à ladite connexion.

6. Procédé selon la revendication 5, comprenant l'étape consistant à envoyer les informations d'identité audit noeud de contrôle (112).

7. Procédé selon l'une quelconque des revendications précédentes, dans lequel ledit système de communication sans fil comprend un noeud fixe (106).

8. Procédé selon la revendication 7, comprenant l'étape consistant à établir une connexion entre ledit noeud fixe (106) et ladite station de base désignée (102). 5
9. Procédé selon l'une quelconque des revendications précédentes, comprenant l'étape consistant à établir une connexion entre ladite station de base désignée (102) et le terminal sans fil (100) avant l'établissement d'une connexion avec la ou chaque autre station de base. 10
10. Procédé selon l'une quelconque des revendications précédentes, comprenant l'étape consistant à envoyer une requête du noeud de contrôle (112) à la ou à chaque autre station de base pour que la ou chaque autre station de base établisse une connexion. 15
11. Procédé selon la revendication 10, dans lequel ladite requête envoyée du noeud de contrôle (112) à la ou à chaque autre station de base comprend des informations concernant la station de base désignée. 20
12. Procédé selon l'une quelconque des revendications précédentes, comprenant l'étape consistant à établir une connexion entre la station de base désignée (102) et la ou chaque autre station de base (104). 25
13. Procédé selon l'une quelconque des revendications précédentes, comprenant l'étape consistant en l'envoi, par la station de base désignée (102) à la ou à chaque autre station de base, de données pour le terminal sans fil (100), la station de base désignée et la ou chaque autre station de base envoyant lesdites données audit terminal sans fil (100). 30
14. Procédé selon l'une quelconque des revendications précédentes, dans lequel ledit terminal sans fil (100) est une station mobile. 35
15. Procédé selon l'une quelconque des revendications précédentes, dans lequel ladite étape de traitement comprend la combinaison desdits signaux. 40
16. Système de communication sans fil comprenant un terminal sans fil, une pluralité de stations de base (102, 104) et un noeud de contrôle (112), le noeud de contrôle étant agencé pour recevoir des informations concernant une station de base désignée parmi lesdites stations de base (102), au moins une autre de ladite pluralité de stations de base étant agencée pour recevoir lesdites informations du noeud de contrôle (112) associé à la station de base désignée parmi lesdites stations de base, chacune desdites stations de base étant agencée pour recevoir les mêmes signaux du terminal sans fil (100), la station de base désignée parmi lesdites stations de base étant agencée pour recevoir de ladite au moins une autre de ladite pluralité de stations de base les signaux reçus du terminal sans fil (100) sur une connexion formée entre ladite station de base désignée parmi lesdites stations de base et ladite au moins une desdites stations de base en utilisant lesdites informations, ledit noeud de contrôle (112) étant agencé pour contrôler ladite formation de ladite connexion, ladite station de base désignée parmi lesdites stations de base comprenant des moyens de traitement pour traiter les signaux reçus de ladite au moins une autre de la pluralité de stations de base et les signaux reçus au niveau de ladite station de base désignée afin de fournir un signal unique. 45
17. Station de base (102) destinée à être utilisée dans un système de communication comprenant un terminal sans fil, une pluralité de stations de base et un noeud de contrôle (112), chacune desdites stations de base étant agencée pour recevoir les mêmes signaux du terminal sans fil (100), dans laquelle ladite station de base comprend : 50
 - des premiers moyens pour recevoir des signaux du terminal sans fil (100) ;
 - des deuxièmes moyens pour recevoir une requête du noeud de contrôle (112), comprenant une indication qu'il peut y avoir au moins une autre connexion entre le terminal sans fil et une autre station de base (104) ;
 - des troisièmes moyens pour fournir au noeud de contrôle (112) des informations concernant la station de base, en réponse à la requête ;
 - des quatrièmes moyens pour recevoir de la ou de chaque autre station de base (104) les signaux reçus du terminal sans fil (100) sur une connexion formée entre la ou chaque autre station de base en utilisant les informations concernant la station de base ; et
 - des moyens de traitement pour traiter les signaux reçus par les premiers et quatrièmes moyens afin de fournir un signal unique. 55
18. Station de base destinée à être utilisée dans un système de communication comprenant un terminal sans fil (100), une pluralité de stations de base et un noeud de contrôle (112), chacune desdites stations de base étant agencée pour recevoir les mêmes signaux du terminal sans fil, dans laquelle ladite station de base comprend :
 - des premiers moyens pour recevoir une requête du noeud de contrôle (112) pour établir une connexion avec une autre desdites stations de base, ladite requête comprenant des informa-

tions concernant l'autre station de base ;
des deuxièmes moyens pour recevoir les signaux du terminal sans fil ;
des troisièmes moyens pour former une connexion avec l'autre station de base en utilisant lesdites informations concernant l'autre station de base ;
des quatrièmes moyens pour transmettre les signaux reçus du terminal sans fil à l'autre station de base sur la connexion.

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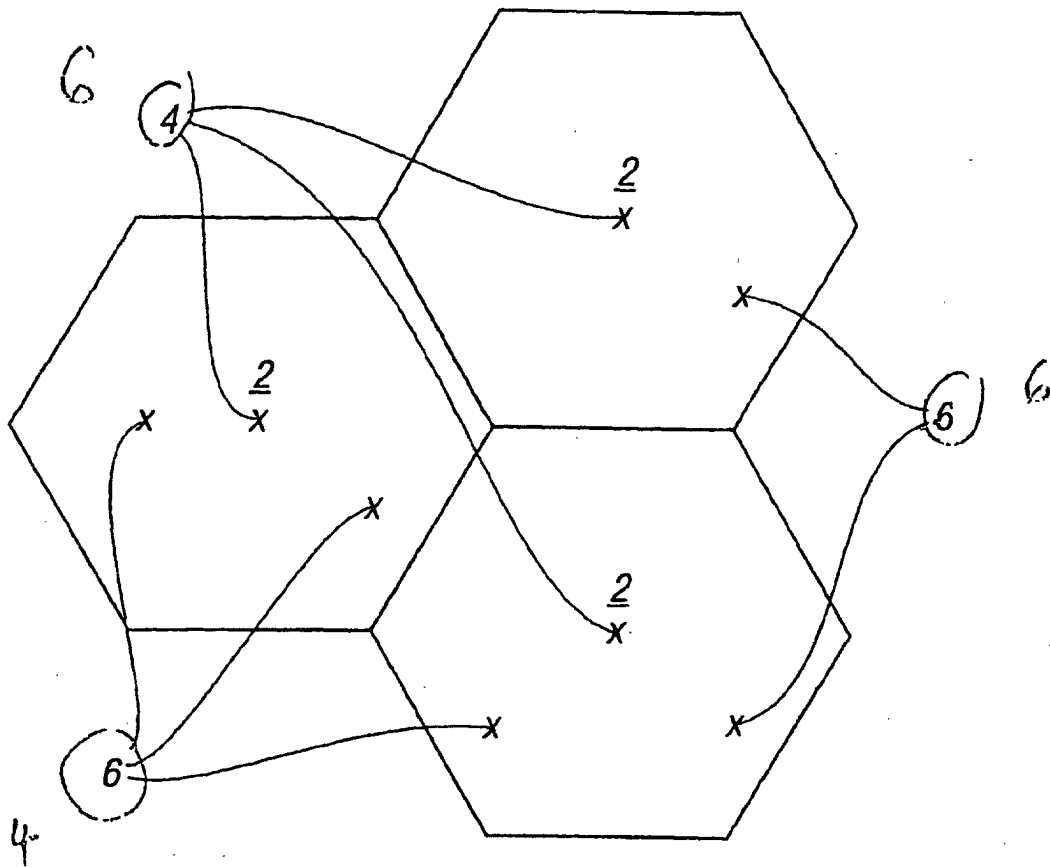


FIG. 1

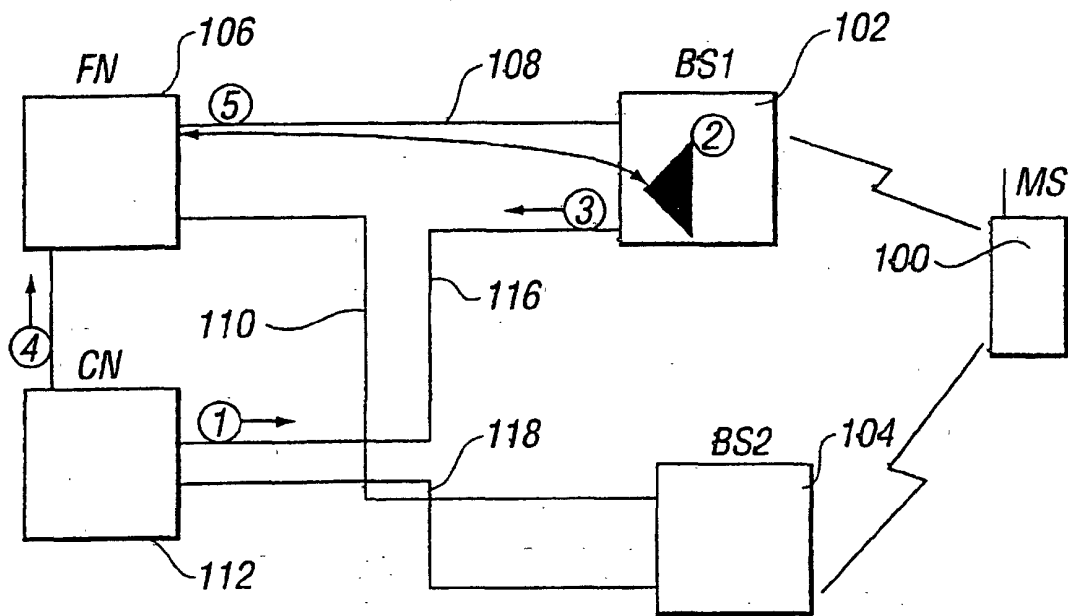


FIG. 2

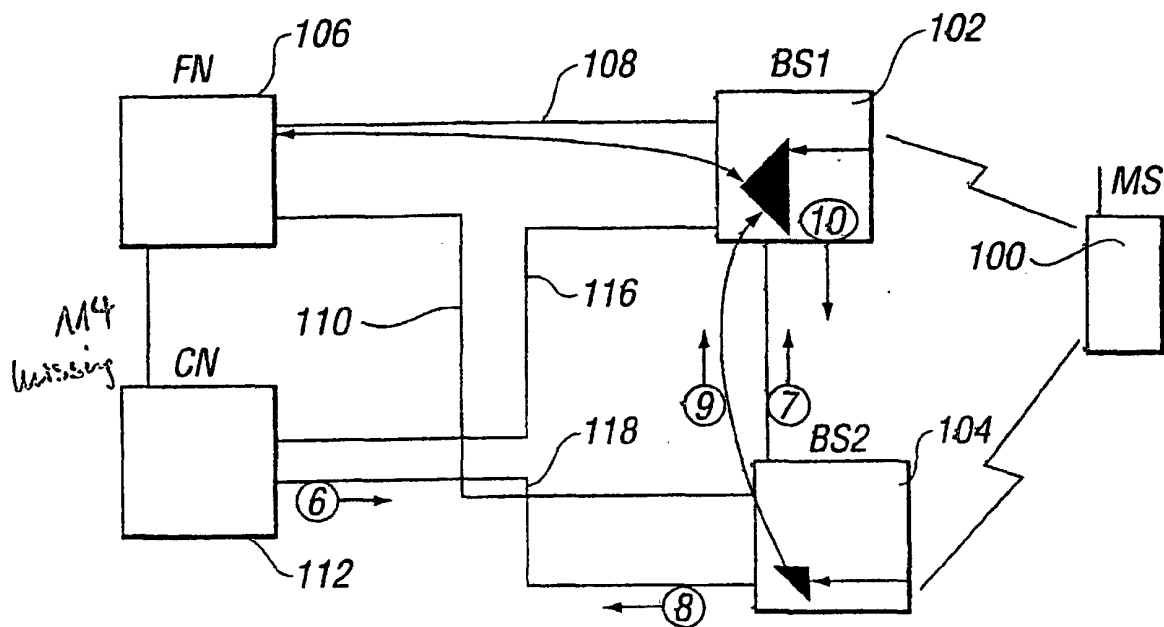


FIG. 3

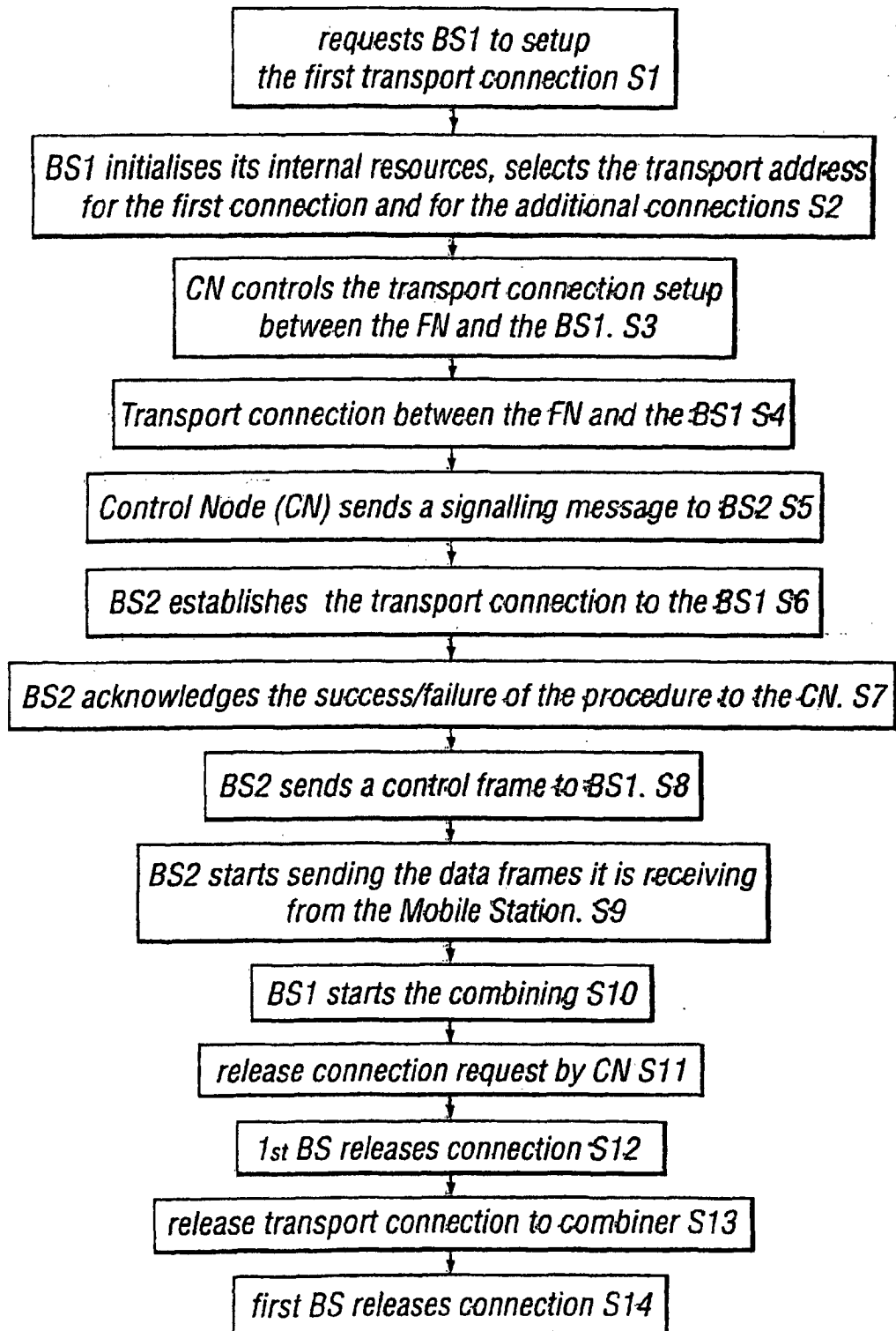


FIG. 4